

What is claimed is:

1. A syringe-to-syringe mixing apparatus comprising:
an elongated body defining a passageway therethrough and configured at its opposite ends to engage a respective syringe thereat with said passageway communicating with the interior volume of each syringe; and
a flow modifying element disposed in said passageway configured to modify the flow of a fluid passing therethrough from syringe to syringe.
2. The syringe-to-syringe mixing apparatus of claim 1, wherein said flow modifying element is integrally formed in said body.
3. The syringe-to-syringe mixing apparatus of claim 1, wherein said body defines a mixing chamber between said flow modifying element and at least one of said opposite ends of said passageway.
4. The syringe-to-syringe mixing apparatus of claim 3, wherein said passageway is configured to receive a portion of the syringe tip therein, and said mixing chamber is defined between said flow modifying element and the syringe tip when the tip is received within said passageway.
5. The syringe-to-syringe mixing apparatus of claim 3, wherein said body defines a mixing chamber between said flow modifying element and both of said opposite ends of said passageway.
6. The syringe-to-syringe mixing apparatus of claim 1, wherein:
said passageway defines a first flow area; and
said flow modifying element includes a restriction configured to increase the flow velocity therethrough, said restriction defining a second flow area less than said first flow area.

7. The syringe-to-syringe mixing apparatus of claim 6, wherein said first flow area is about five times greater than said second flow area.

8. The syringe-to-syringe mixing apparatus of claim 6, wherein said passageway and said restriction are substantially cylindrical.

9. The syringe-to-syringe mixing apparatus of claim 6, wherein said restriction is in the form of a slit.

10. The syringe-to-syringe mixing apparatus of claim 6, wherein said restriction is in the form of a multi-lobed opening.

11. The syringe-to-syringe mixing apparatus of claim 6, wherein:
said passageway includes a first portion adjacent one end of said passageway and a second portion adjacent the opposite end of said passageway, said first and second portions having longitudinal axes offset from each other; and

said restriction is defined by an intersection between said first and second portions of said passageway.

12. The syringe-to-syringe mixing apparatus of claim 6, wherein:
said passageway includes a first portion adjacent one end of said passageway and a second portion adjacent the opposite end of said passageway; and

said restriction includes a plurality of nozzles in communication between said first and second portions.

13. The syringe-to-syringe mixing apparatus of claim 1, wherein said flow modifying element includes at least two nozzles in said passageway, each configured to increase the flow velocity therethrough.

14. The syringe-to-syringe mixing apparatus of claim 13, wherein said body defines an intermediate mixing chamber between successive ones of said at least two nozzles.

15. The syringe-to-syringe mixing apparatus of claim 14, wherein: said intermediate mixing chamber defines a first flow area; and each of said at least two nozzles defines a second flow area less than said first flow area.

16. The syringe-to-syringe mixing apparatus of claim 1, wherein said flow modifying element includes at least two baffles forming a serpentine flow path through said passageway.

17. The syringe-to-syringe mixing apparatus of claim 1, wherein said flow modifying element includes a plurality of pins traversing said passageway.

18. The syringe-to-syringe mixing apparatus of claim 1, further comprising an orifice defined in said body in communication with said passageway between said opposite ends thereof, said orifice arranged for introduction of a constituent into said passageway.

19. The syringe-to-syringe mixing apparatus of claim 18, wherein said orifice is a sealed orifice.

20. The syringe-to-syringe mixing apparatus of claim 18, further comprising a valve covering said orifice to prevent flow of the constituent therethrough.

21. The syringe-to-syringe mixing apparatus of claim 20, wherein said valve is a septum covering said orifice, said septum adapted to be penetrated by a fluid introduction component.

22. The syringe-to-syringe mixing apparatus of claim 21, wherein said septum is formed of a self sealing material.

23. A fluid mixing apparatus comprising:
a first syringe having a hollow tip communicating with the interior volume of said first syringe;
a second syringe having a hollow tip communicating with the interior volume of said second syringe; and
a mixing apparatus including;
a body defining an elongated passageway therethrough and fittings at opposite ends of said passageway, each of said fittings configured to engage the tip of a corresponding one of said first and second syringes with the passageway communicating with the interior volume of the corresponding syringe; and
a flow modifying element disposed in said passageway configured to modify the flow of a fluid passing therethrough.

24. The syringe-to-syringe mixing apparatus of claim 23, wherein said body defines a mixing chamber between said flow modifying element and at least one of said opposite ends of said passageway.

25. The syringe-to-syringe mixing apparatus of claim 24, wherein said passageway is configured to receive a portion of the syringe tip therein, and said mixing chamber is defined between said flow modifying element and the syringe tip when the tip is received within said passageway.

26. The syringe-to-syringe mixing apparatus of claim 24, wherein said body defines a mixing chamber between said flow modifying element and both of said opposite ends of said passageway.

27. The syringe-to-syringe mixing apparatus of claim 23, wherein:
said passageway defines a first flow area; and
said flow modifying element includes a nozzle configured to increase the flow velocity therethrough, said nozzle defining a second flow area less than said first flow area.

28. An improvement to a syringe-to-syringe mixing apparatus comprising a nozzle element disposed within the tip of a syringe, said nozzle element defining a passageway therethrough in communication with the interior volume of the syringe and including a restriction in at least one end of said nozzle element adjacent the interior volume of the syringe, said restriction configured to increase the flow velocity therethrough.

29. The improvement of claim 28, wherein said nozzle element is an insert configured to be mounted within the tip of the syringe.

30. The improvement of claim 29, wherein said insert includes a retaining flange at an opposite end of said nozzle element, said retaining flange configured to engage the end of the syringe tip.

31. The improvement of claim 29, wherein said insert is configured to be inserted into the tip of the syringe through the interior volume of the syringe.

32. The improvement of claim 28, wherein said nozzle element is integrally formed within the tip of the syringe.

33. The improvement of claim 28, wherein said restriction includes at least a portion of said passageway having a flow area that decreases toward the interior volume of the syringe.

34. The improvement of claim 28, further comprising a body including fittings at opposite ends thereof configured to be mounted to a syringe, said body defining a body passageway in communication with said nozzle element passageway when the body is mounted on the syringe.

35. The improvement of claim 34, wherein:
said nozzle element is an insert configured to be mounted within the tip of the syringe, said insert having a head at an opposite end of said nozzle element;
and
said body passageway is configured to receive said head of said insert therein.

36. The improvement of claim 35, further comprising a connector disposed between said body and the syringe, said connector defining a channel for receiving the syringe tip therein with said insert mounted within the tip and including opposite fittings configured to engage said body and the syringe.

37. In a syringe-to-syringe mixing system of the type having two syringes adapted to reciprocally pass fluid therebetween until mixed, a mixing apparatus comprising means, adapted to communicate with each of the two syringes, for modifying the flow of fluid between the two syringes.

38. The mixing apparatus of claim 37, wherein said means for modifying the flow of fluid is configured for disposition between the two syringes.

39. The mixing apparatus of claim 38, wherein said means for modifying the flow of fluid includes an elongated body, adapted at its ends to engage a corresponding one of the two syringes, said elongated body defining a fluid passageway in communication with the two syringes and a restriction within said passageway.

40. The mixing apparatus of claim 37, wherein said means for modifying the flow of fluid is configured for disposition within one of the two syringes.

41. The mixing apparatus of claim 40, wherein said means for modifying the flow of fluid includes a nozzle insert configured for engagement within the tip of one of the two syringes.

42. The mixing apparatus of claim 37, further comprising means for introducing a small quantity of a constituent into the flow of fluid between the two syringes.

43. The mixing apparatus of claim 42, wherein:
said means for modifying the flow of fluid includes an elongated body defining a fluid passageway in communication with the two syringes and a restriction within said passageway; and
said means for introducing includes;
an orifice in fluid communication with said passageway; and
a valve sealing said orifice, said valve openable to permit introduction of the small quantity of a constituent.

44. The mixing apparatus of claim 43, wherein said valve includes a septum covering said orifice, said septum formed of a self-sealing material adapted for penetration by a needle through which the small quantity of a constituent is introduced.